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UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Johannes Reinschke et al.
Application Number:	10/591,089
Filing Date:	05/21/2007
Group Art Unit:	2834
Examiner:	Michael Andrews
Title:	LINEAR DRIVE UNIT WITH AN OSCILLATING ARMATURE PART AND A SPRING

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APPEAL BRIEF

Pursuant to 37 CFR §41.37, Appellants hereby file an appeal brief in the above-identified application. This Appeal Brief is accompanied by the requisite fee set forth in 37 CFR §41.20(b)(2) and a petition for a one-month extension of time.

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(1) REAL PARTY IN INTEREST

The real party in interest is BSH Bosch und Siemens Hausgeräte GmbH.

(2) RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) SUMMARY OF CLAIMED SUBJECT MATTER

A listing of each independent claim, each dependent claim argued separately is provided below including exemplary reference(s) to page and line or paragraph number(s) of the specification.

Claim 7. A linear drive unit (e.g., 10 in Fig. 1, Paragraph 18) comprising:

a yoke body (e.g., 12 in Fig. 1, Paragraphs 18-21) having an exciter winding (e.g., 11 in Fig. 1, Paragraph 18) providing a magnetic field;

a magnetic armature part (e.g., 15 in Fig. 1, Paragraph 18) which is set in linear motion to symmetrically oscillate about a center position (e.g., Mp in Fig. 1, Paragraphs 18-21) in an axial direction by the magnetic field of the winding, the center position being the position the armature part adopts when oscillating between its maximum lateral deflection positions (e.g., L_1 and L_2 in Fig. 1, Paragraphs 18-19), wherein a center of the armature is aligned with a center of the yoke body in the center position (e.g., Fig. 1, Paragraphs 18-19); and

a spring (e.g., 2 and 2' in Fig. 1, Paragraph 19) having a fixed end clamped in a fixed manner at a clamped position with respect to the yoke body (e.g., B and B' in Fig. 1, Paragraph 21) and an oscillating end coupled to the armature part at a point of application and acting on the armature part in the direction of motion (e.g., A and A' in Fig. 1, Paragraph 21);

wherein in the center position of the armature part, the point of application of the spring on the armature part being displaced axially by a predetermined distance (e.g., Δx in Fig. 1, Paragraph 21) in relation to the clamped position, and

wherein the spring is configured as a leaf spring (e.g., Paragraph 19) and when the armature part is at the center position the spring is pre-tensioned to apply a force in the direction of movement of the armature part (e.g., Paragraph 19).

Claim 10. The drive unit according to claim 7, wherein the armature part is connected to a plunger of a compressor (e.g., V in Fig. 1, Paragraph 20), the axial displacement of the point of application of the spring on the armature part being provided in the direction away from the compressor. (e.g., Fig. 1)

Claim 11. The drive unit according to claim 7, wherein the spring has a spring constant selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force. (e.g., Paragraph 10)

Claim 13. A linear drive unit (e.g., 10 in Fig. 1, Paragraph 18) comprising:

a yoke body (e.g., 12 in Fig. 1, Paragraphs 18-21) having an exciter winding providing a magnetic field (e.g., 11 in Fig. 1, Paragraph 18);

a magnetic armature part (e.g., 15 in Fig. 1, Paragraph 18) configured to be set in linear oscillating motion about a center position (e.g., Mp in Fig. 1, Paragraphs 18-21) in an axial direction by the magnetic field of the winding, the center position being the position the center of the armature part adopts when aligned with the center (e.g., along line Mp in Fig. 1) of the yoke body in which the armature may symmetrically oscillate relative to the yoke body between its maximum lateral deflection positions (e.g., L_1 and L_2 in Fig. 1, Paragraphs 18-19); and

a spring (e.g., 2 and 2' in Fig. 1, Paragraph 19) fixed with respect to the yoke body at a clamped position (e.g., B and B' in Fig. 1, Paragraph 21) and an oscillating end coupled to the armature part at a point of application (e.g., A and A' in Fig. 1, Paragraph 21) and acting on the armature part in a direction of motion;

wherein when the armature part is in the center position, the point of application of the spring on the armature part is axially displaced a predetermined distance (e.g., Δx in Fig. 1, Paragraph 21) from the clamped position of the spring, such that the spring is pre-tensioned to apply a force in the axial direction (e.g., Paragraph 19).

Claim 17. A compressor (e.g., V in Fig. 1, Paragraph 20) comprising a pump, a plunger (e.g., Paragraph 10) and the drive unit of claim 13, wherein the axial displacement of

the point of application of the spring on the armature part is provided in the direction away from the compressor (e.g., Fig. 1).

Claim 18. The drive unit according to claim 13, wherein the spring has a spring constant selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force. (e.g., Paragraph 10)

Claim 19. The drive unit according to claim 13, wherein the armature part includes two magnets (e.g., 9a and 9b in Fig. 1, Paragraph 18) arranged symmetrically on each side of the yoke body in the center position.

Claim 20. A linear drive unit (e.g., 10 in Fig. 1, Paragraph 18) comprising:

a yoke body (e.g., 12 in Fig. 1, Paragraphs 18-21) having an exciter winding (e.g., 11 in Fig. 1, Paragraph 18) providing a magnetic field;

a magnetic armature part (e.g., 15 in Fig. 1, Paragraph 18) which is set in linear oscillating motion about a center position (e.g., Mp in Fig. 1, Paragraphs 18-21) in an axial direction by the magnetic field of the winding, the center position being the position where the center of the armature is aligned with the center of the yoke body and/or windings thereof, the center position being an equidistant point between two maximum lateral deflections (e.g., L_1 and L_2 in Fig. 1, Paragraphs 18-19) of the magnetic armature when oscillating; and

a spring (e.g., 2 and 2' in Fig. 1, Paragraph 19) having a fixed end (e.g., B and B' in Fig. 1, Paragraph 21) clamped in a fixed manner at a clamped position with respect to the yoke body and an oscillating end (e.g., A and A' in Fig. 1, Paragraph 21) coupled to the armature part at a point of application and acting on the armature part in the direction of motion;

wherein when the armature part is at the center position, the point of application of the spring on the armature part is displaced axially by a predetermined distance in relation to the clamped position of the spring (e.g., Δx in Fig. 1, Paragraph 21), and

wherein the spring is configured to be pre-tensioned to apply a force in an axial direction along movement of the armature part when the armature part is at the center position (e.g., Paragraph 19).

Claim 23. A compressor comprising a pump, a plunger and the drive unit of claim 20, wherein the axial displacement of the point of application of the spring on the armature part is provided in the direction away from the compressor. (e.g., V in Fig. 1, Paragraph 20).

Claim 24. The drive unit according to claim 20, wherein the spring has a spring constant selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force. (e.g., Paragraph 10)

Claim 25. The drive unit according to claim 20, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position. (e.g., 9a and 9b in Fig. 1, Paragraph 18).

Claim 26. The drive unit according to claim 7, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position. (e.g., 9a and 9b in Fig. 1, Paragraph 18).

(4) ARGUMENT

A. Claims 7, 9-10, 13-17, 19-23, And 25-26 Are Not Obvious Over Zabar And Rumswinkel.

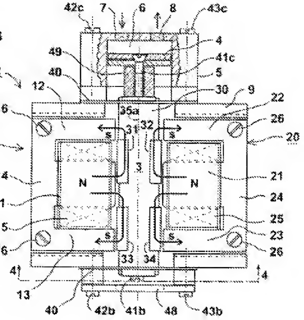
Claims 7, 9-10, 13-17, 19-23, and 25-26 stand rejected under 35 U.S.C. § 103 as allegedly being obvious over Zabar (U.S. Patent No. 6,323,568) in view of Rumswinkel (DE 1146578). This rejection is erroneous and should be reversed for at least the following reasons.

The instant application is directed to improvements in linear drive systems. Such improvements may allow for higher efficiency and easier and/or more rapid startup of a linear drive system. *See* Paragraph 6. In this improved system, an armature may be displaced from its "rest position" to the "center position." Paragraph 8; See also Fig. 1. The center position is shown as point Mp in Fig. 1 (discussed in more detail below) of the application. This position is understood to be the position that the armature adopts between the two maximum lateral deflection points of the oscillating armature. Paragraph 7. Accordingly, when the armature is located in the center position a spring applies a force (due to tension in the spring) along the axial movement path of the armature.

The Final Office Action of November 2, 2012 (hereinafter "Final Office Action) relies upon two references in rejecting the above identified claims. The first of these is Zabar, which discusses an electromagnet assembly for a conventional universal drive unit. *See* Abstract. The drive unit in Zabar is designed to produce "relatively large longitudinal movements, but relatively negligible transverse movements." *See* Column 3, Lines 5-7.

These large longitudinal movements appear to be parallel to line 35a in Zabar's Fig. 3, reproduced below. *See* Column 4, Lines 25-29.

FIG. 3



Basically, the plunger 3 in Fig. 3 reciprocates about a center position. The position shown in Fig. 3 is also the rest position of the plunger. In other words, the plunger is at both its rest position and center position in Fig. 3. This is further illustrated in Zabar's Fig. 8, reproduced below, where the armature is shown in the center position 3a and reciprocates between maximum deflection points 3b and 3c. *See* Column 5, Lines 16-23.

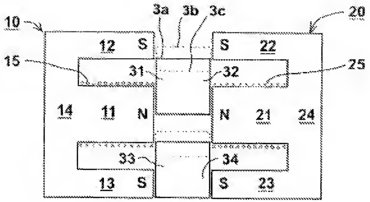


FIG. 8

The Final Office Action also relies on Rumswinkel, which discloses an oscillating armature system for shaving appliances (e.g., an electric shaver) that includes an armature that oscillates transversely with respect to two pole end faces. The armature is supported by two torsion springs. It is also noted that Rumswinkel is a German Patent with no corresponding English language counterpart. Accordingly, Appellant acquired a professional human translation of Rumswinkel (hereinafter "Rumswinkel Professional Translation") and submitted the same to the Patent Office on April 18, 2011.

<u>1. Independent claims 7, 13, and 20 Are Not Obvious Over Zabar and Rumswinkel.</u>

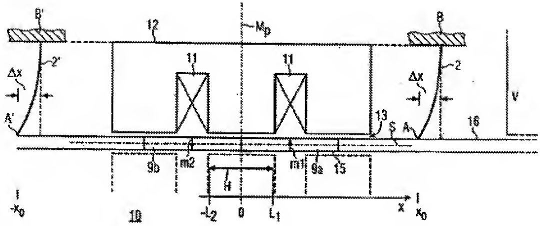
Independent claim 7 recites, in combination, "a magnetic armature part which is set in linear motion to <u>symmetrically oscillate about a center position</u>... the center position being the position the armature part adopts when oscillating between its maximum lateral deflection positions... <u>a center of the armature is aligned with a center of the yoke body in the center</u>

position... when the armature part is at the center position the spring is pre-tensioned to apply a force in the direction of movement of the armature part."

Independent claim 13 recites, in combination, "the center position being the position the center of the armature part adopts when aligned with the center of the yoke body in which the armature may symmetrically oscillate relative to the yoke body between its maximum lateral deflection positions...wherein when the armature part is in the center position, the point of application of the spring on the armature part is axially displaced a predetermined distance from the clamped position of the spring, such that the spring is pre-tensioned to apply a force in the axial direction."

Independent claim 20 recites, in combination, "the center position being the position where the center of the armature is aligned with the center of the yoke body and/or windings thereof, the center position being an equidistant point between two maximum lateral deflections of the magnetic armature when oscillating... the spring is configured to be pre-tensioned to apply a force in an axial direction along movement of the armature part when the armature part is at the center position."

Such features are not taught or suggested by Zabar, Rumswinkel, or the alleged combination thereof. To further illustrate such features, Fig. 1 of the instant application is reproduced below.



Here, the armature 15 is shown at the "center position," Mp, and oscillates between the minimum and maximum points $-L_2$ and L_1. Further, in the center position, springs 2 and 2' are displaced by Δx (e.g., a predetermined distance) away from the clamped positions B and B' and affixed to the armature at A and A'. Accordingly, when the armature is in the center position Mp, the springs 2 and 2' are displaced by a distance x from the fixed position away from the compressor and apply a force towards the compressor V (e.g., in the direction of armature movement). *See* Paragraphs 18-21.

As noted above, Zabar discusses a drive unit, but it fails to discuss the features set forth in the independent claims. Indeed, the Final Office Action acknowledges as such, by noting that "Zabar does not expressly disclose that, <u>when the armature part is at the center position</u>, the point of application of the spring on the armature part is displaced axially by a predetermined distance in relation to the claimed position of the spring, or that when the

armature part is at the equilibrium [center] position the spring is pre-tensioned."[1] Final Office Action at page 11-12, emphasis added.

To cure Zabar's deficiency, the Final Office Action relies upon Rumswinkel's electric shaver disclosure. The primary focus of the Final Office Action is Rumswinkel's figure 3, which is reproduced below.

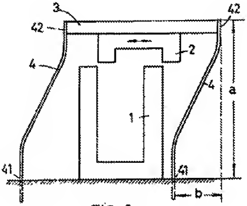


FIG. 3

In Fig. 3, 1 is a magnet with respective pole ends, 2 is an armature, and 4 is a pair of spiral or leaf springs that <u>rotate</u> at their respective bases 41 as the armature moves (in the directions indicated by the double-arrow on the armature). Rumswinkel also refers to the position of the armature shown in Fig. 3 as the position of "repose." *See* Professional Rumswinkel Translation at Page 1, Lines 8-9. Further, when the shaver is in use, the armature 2 is "pulled periodically centrally to in front of the pole end face of the magnet 1." *See* Professional Rumswinkel Translation at Page 3, Lines 20-24.

[1] The term "equilibrium" is not present in the claims. This term was removed in a prior response and, in certain cases, substituted for the current term, "center." See Applicant's Response of April 18, 2011 at Page 6.

The Final Office Action alleges that, "figures 2-3 [of Rumswinkel] show the axially displaced armature in its equilibrium position; at the center position, which is shifted to the left from what is shown in the figures, the springs are inherently pre-tensioned as they are no longer at equilibrium." Final Office Action at Page 6.

This interpretation, however, does not reflect what is actually disclosed (or not disclosed) by Rumswinkel nor does it reflect how the claimed center position is related to other elements in the claims. Specifically, first, with respect to independent claim 20, the center point is an equidistant point between two maximum lateral deflections. Independent claims 7 and 13 set forth that the armature symmetrically oscillates about the center position between the maximum lateral deflection points. Second, the independent claims set forth that the center position is the position where the center of the armature is aligned with the center of the yoke body and/or windings thereof. In contrast to such features, the armature in Rumswinkel's shaver system cannot adopt a position in which both of the above properties apply.

Rumswinkel is silent as to where the center position of the oscillating armature is located.

Rumswinkel does not teach or suggest where the center position of the oscillating may be located. What Rumswinkel does disclose is that the armature "is pulled periodically centrally to in front of the pole end face of the magnet 1 by the periodic attraction force of the

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Applicant also notes that the Final Office Action, continually refers to "equilibrium," despite the term not be present anywhere in the claims.

magnet 1. The rocking motion direction of the armature is indicated by the double arrow 20." Professional Rumswinkel Translation at Page 1, Lines 9-12. In other words, the shaver appears to operate such that the magnetic armature 2 is pulled into alignment with the magnet 1. As Rumswinkel refers to this as a pulling "attraction" it would seem that this position adopted by the armature is a <u>maximum</u> deflection point in the oscillation of the armature. However, without knowing where the <u>other</u> maximum deflection point is located, it does not seem possible to tell where (in relation to Rumswinkel's Fig. 3) the "center position" of the oscillation of the armature would be located.

Indeed, to Appellant, it seems just as likely (if not more so) that the position adopted by the armature in Fig. 3 is the equidistant or symmetric oscillation point. Specifically, as can be seen in the above reproduction of Fig. 3, at this position the armature includes a double headed arrow. Rumswinkel refers to this arrow (which is 20 in Fig. 1 of Rumswinkel) as indicating the "rocking motion" of the armature. See Professional Rumswinkel Translation at Page 1, Lines 8-9. Thus, from the armature's position shown in Fig. 3, the armature will rock <u>both</u> to the left and to the right. Further, as the arrow 20 appears to be symmetrically positioned on the armature and the left and right arrows appear to be the same length, a person of ordinary skill would have assumed that the armature would oscillate the same distance to the left and right from the shown position in Fig. 3.

The Final Office Action's assertion that the center position is "shifted to the left from what is shown in the figures," is therefore <u>not supported by any disclosure</u> (either express or inherent) found in Rumswinkel. Moreover, there is additional evidence that the illustrated

position of the armature in Fig. 3, not some position "to the left," would be the symmetric oscillation point of the armature.

There is no position that is "left" from the position shown in Rumswinkel's Figure 3 that is the claimed center position.

First, as noted above, Rumswinkel discusses that the armature is periodically "pulled" into alignment with the magnet. However, as set forth above, this would result in the armature being at a maximum deflection point in its oscillation. In other words, this point is as far away as possible from the center of the oscillation.

Further, Rumswinkel does not discuss any other force that could push/pull the armature past the magnets. Accordingly, even if magnet and armature align (e.g., the second point discussed above) at this maximum position, the alignment of such would not be at a position that is "equidistant point between two maximum lateral deflections" as required in claim 20 or a symmetric oscillation point as set forth in independent claims 7 and 13.

Second, none of the other oscillation positions that the armature could adopt to the right of the alignment of the armature and the magnet and to the left of the position shown in Fig. 3 would satisfy the requirements of a "center position." Specifically, any such position would not result in alignment of the yoke body and the armature while also being, for example, a point that is equidistant between the two maximum deflection points.

There is no discussion that the springs in Rumswinkel's apply a force in an axial direction along movement of the armature when the armature part is in the center position.

Independent claim 20 recites, in combination, "wherein the spring is configured to be pre-tensioned to apply a force in an axial direction along movement of the armature part when the armature part is at the center position." Independent claim 13 recites, in combination, "the spring is pre-tensioned to apply a force in the axial direction." Independent claim 7 recites, in combination, "when the armature part is at the center position the spring is pre-tensioned to apply a force in the direction of movement of the armature part." In relation to these features, the Final Office Action alleges that at some point to the left of the shown position in Rumswinkel's Fig. 3 that the springs "are <u>inherently</u> pre-tensioned as they are no longer at equilibrium." At Page 12, emphasis added.

<u>First</u>, the Final Office Action has failed to provide any evidence that Rumswinkel <u>inherently</u> operates as alleged (e.g., that the spring would be inherently pre-tensioned). In order to establish inherency, the PTO must establish that the feature in question is "necessarily present" in the reference. See MPEP 2112(IV). Here, the only "evidence" offered appears to be that the springs are no longer in equilibrium. There is no discussion of <u>why</u> the springs would no longer be at equilibrium or even that the force applied from the now tensioned springs would be applied in an <u>axial direction</u> as set forth in the claims.

Indeed, if there is a force applied by the springs it would appear to be applied in a direction that is <u>transverse</u> to that of the movement of the armature. In other words, the opposite of what is set forth in the claims.

Such an interpretation is supported by the problems Rumswinkel was attempting to address in his shaver system. In particular, Rumswinkel discusses the problems associated

with having the armature and the magnet run into each other. One way to prevent this is to use springs to apply an opposing force to maintain a small air gap between the magnet and the armature as the armature moves back and forth. See, e.g., Professional Rumswinkel Translation at Page 3, Lines 13-16. However, with the conventional embodiment shown in Fig. 1, the spring may "buckle." The conventional solution to this problem is to move the armature and magnet further apart (e.g., to decrease the magnetic force). Page 1, Lines 33-34. However, this decreases the efficiency of the system.

Rumswinkel's solution is to offset the springs. This appears to allow the springs to be placed closer to the base of the magnets (compare Fig. 1 to Fig. 2 in Rumswinkel). It would also seem to increase the force to offset the magnetic attraction while decreasing the chance of the spring buckling because the spring is straight up and down (or closer to being so) when the armature and magnet are aligned. See Page 3 at Lines 23-26. Accordingly, Rumswinkel does not appear to contemplate using a force applied in an axial direction but uses a force that would be transverse to such a direction.

Second, there is no discussion in Rumswinkel of the spring providing an axial force. Moreover Rumswinkel's implemention may preclude the application of an axial force because the springs pivot when the armature moves laterally as a result of being pulled by the magnets. Specifically, Rumswinkel states "In this type as well, the pivoting motion of the spiral springs causes a circular-arclike motion of the top end 42, and buckling of the spiral springs can occur in this type as well." Page 4, Lines 1-2. Accordingly, as the springs pivot and do not bend (as shown in Fig. 1 of the instant application) there is no axial force to be applied by the springs.

Therefore, Rumswinkel cannot supply the teachings that the Final Office Action acknowledges are missing from Zabar, "when the armature part is at the center position, the point of application of the spring on the armature part is displaced axially by a predetermined distance in relation to the claimed position of the spring, or that when the armature part is at the equilibrium position the spring is pre-tensioned." In other words, as Rumswinkel's armature cannot adopt the above emphasized condition precedent, it cannot supply the further teachings of how the springs are related to the armature.

In essence, it appears that in attempting to relate the above noted features (e.g., displacement of the spring) to Rumswinkel's disclosure, the Final Office Action ignores the requirement that the above features are associated with the armature part in the center position.

A person of ordinary skill in the art would not combine Zabar with Rumswinkel.

The Office Action states, "it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the linear drive unit of Zabar by offsetting the armature part as taught by Rumswinkel, for improving the efficiency thereof, since Rumswinkel teaches that such a drive unit minimizes the air gap between the magnetic components." Office Action at Page 6.

However, the techniques used by Rumswinkel to minimize the air gap would be of no use to the teachings in Zabar. Specifically, Zabar already alleges that his design minimizes air gaps by noting that "the gap between the plunger and electromagnets to be very small, thereby increasing efficiency." Column 5, Lines 35-45. Further, as discussed above, Zabar's

electromagnet allows for large longitudinal displacement but negligible transverse displacement. *Id.* In other words, the very "motivation" that the Final Office Action alleges would cause a person of ordinary skill in the art to seek out the teachings in Rumswinkel is already addressed by Zabar.

Moreover, even if a person of ordinary skill in the art would, for some reason, ignore the already solved problem in Zabar with Rumswinkel's teachings, Rumswinkel's teachings would have no effect on any air gap in Zabar. In particular, Zabar's design has the plunger bounded on both sides by magnets. How would offsetting the armature part in Zabar further assist in minimizing the air gap as taught in Rumswinkel? To applicant such an adjustment would be completely irrelevant.

In sum, the Final Office Action ignores how the center position is specified in the claims, how the placement of the springs is with respect to the "center position," and that Rumswinkel is not combinable with Zabar. Therefore, the rejection of independent claims 7, 13, and 20 should be reversed.

2. Dependent Claims 10, 17, and 23 Are Not Obvious Over Zabar And Rumswinkel.

Dependent claim 10 recites, in combination, "wherein the armature part is connected to a plunger of a compressor, the axial displacement of the point of application of the spring on the armature part being provided in the direction away from the compressor." Dependent claim 17 recites, in combination, "A compressor comprising a pump, a plunger and the drive unit of claim 13, wherein the axial displacement of the point of application of the spring on the armature part is provided in the direction away from the compressor." Dependent claim

23 recites, in combination, "A compressor comprising a pump, a plunger and the drive unit of claim 20, wherein the axial displacement of the point of application of the spring on the armature part is provided in the direction away from the compressor." Such features are not taught or suggested by Zabar, Rumswinkel, or combination thereof.

Dependent claims 10, 17, and 23 respectively depend from independent claims 7, 13, and 20. Accordingly, the above arguments with respect to the independent claims are hereby incorporated.

The Office Action appears to acknowledge that Zabar does not disclose that the axial displacement, in the center position, of the point of application of the spring to the armature is <u>away</u> from the <u>compressor</u>. See Final Office Action at Pages 6-7. To make up for this deficiency the Final Office Action relies upon Rumswinkel's spring displacement as shown in the above reproduced Figure 3.

However, while the springs in Fig. 3 may be displaced, there is no teaching or suggestion that the application point is <u>away</u> from <u>a compressor</u>. Indeed, as Rumswinkel is directed to an electric shaver, there is no discussion at all of a compressor.

Also, the alleged motivation relied upon in the Final Office Action of "minimizing the air gap," would be of no use given the teachings of Zabar, as Zabar already addresses the air gap problem referred to in Rumswinkel.

Moreover, the difference in teachings between Zabar and Rumswinkel emphasizes that a person of ordinary skill in the art would not seek to combine the electric shaver teachings of

Rumswinkel with the drive unit disclosed in Zabar. Accordingly, the rejection of claims 10, 17, and 23 should be reversed for these additional reasons.

4. Dependent Claims 19, 25, and 26 Are Not Obvious Over Zabar And Rumswinkel.

Dependent claim 26 recites, in combination, "The drive unit according to claim 7, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position." Dependent claim 19 recites, in combination, "The drive unit according to claim 13, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position." Dependent claim 25 recites, in combination, "The drive unit according to claim 20, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position." Such features are not taught or suggested by Zabar, Rumswinkel, or combination thereof.

Dependent claims 26, 19, and 25 respectively depend from independent claims 7, 13, and 20. Accordingly, the above arguments with respect to the independent claims are hereby incorporated.

The Final Office Action alleges that Figure 3 in Zabar discloses the symmetrical placement of magnets on the armature when it is in the center position. However, as can be seen from Zabar's Fig. 3 shown above, the magnets 31-34 are not symmetrically placed on each side of the yoke body. Instead, the magnets are <u>offset</u> with respect to the yoke body. Thus, the rejection of claims 26, 19, and 25 should be reversed for this additional reason.

B. Claims 11, 18, and 24 Are Not Obvious Over Zabar, Rumswinkel, and Howe.

Claims 11, 18, and 24 stand rejected under 35 U.S.C. § 103 as allegedly being obvious over Zabar, Rumswinkel, and further in view of Howe (U.S. 3,678,308). This rejection is erroneous and should be reversed for at least the following reasons.

These claims set forth additional features in which the spring constant of the spring is selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force. Claims 11, 18, and 24 respectively depend from independent claims 7, 13, and 20. Accordingly, the above arguments with respect to the independent claims are hereby incorporated.

Howe is directed to a scanning device that uses springs. The Final Office Action alleges that the following discussion in Howe teaches these features

> The present invention overcome this and other problems by utilizing the spring of the aforementioned device simply as a source of mechanical energy with no electrical function and by driving a modified magnetic means by an external electrical signal having, for example, an off-on square wave at twice the desired scan frequency of the element.

Column 1, Lines 37-42; See Final Office Action at Page 14-15. However, a discussion that "an off-on square wave [is] at twice the desired scan frequency of the element," does not relate to having a spring with a spring constant "such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force." Indeed, there does not appear to be any discussion in Howe of selecting or identifying a spring constant based on the factors set forth in the above claims.

Furthermore, Howe also fails to make up for the above explained deficiencies of Zabar and Rumswikel with respect to the independent claims. For example, there is no teaching or suggestion in Howe of the claimed center position, or how the placement of the springs is with respect to the "center position."

Accordingly, for at these reasons, claims 11, 18, and 24 are non-obvious over the alleged combination of Zabar, Rumswinkel, and Howe and the rejection should be reversed.

(5) CONCLUSION

In view of the foregoing discussion, Appellants respectfully request reversal of the Examiner's rejections.

Respectfully submitted,

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CLAIMS APPENDIX

1-6. (Canceled)

7. (Rejected) A linear drive unit comprising:

a yoke body having an exciter winding providing a magnetic field;

a magnetic armature part which is set in linear motion to symmetrically oscillate about a center position in an axial direction by the magnetic field of the winding, the center position being the position the armature part adopts when oscillating between its maximum lateral deflection positions, wherein a center of the armature is aligned with a center of the yoke body in the center position; and

a spring having a fixed end clamped in a fixed manner at a clamped position with respect to the yoke body and an oscillating end coupled to the armature part at a point of application and acting on the armature part in the direction of motion;

wherein in the center position of the armature part, the point of application of the spring on the armature part being displaced axially by a predetermined distance in relation to the clamped position, and

wherein the spring is configured as a leaf spring and when the armature part is at the center position the spring is pre-tensioned to apply a force in the direction of movement of the armature part.

8. (Canceled).

9. (Rejected) The drive unit according to claim 7, further comprising a plurality of springs disposed on each side of the center position.

10. (Rejected) The drive unit according to claim 7, wherein the armature part is connected to a plunger of a compressor, the axial displacement of the point of application of the spring on the armature part being provided in the direction away from the compressor.

11. (Rejected) The drive unit according to claim 7, wherein the spring has a spring constant selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force.

12. (Canceled).

13. (Rejected) A linear drive unit comprising:

a yoke body having an exciter winding providing a magnetic field;

a magnetic armature part configured to be set in linear oscillating motion about a center position in an axial direction by the magnetic field of the winding, the center position being the position the center of the armature part adopts when aligned with the center of the

yoke body in which the armature may symmetrically oscillate relative to the yoke body between its maximum lateral deflection positions; and

a spring fixed with respect to the yoke body at a clamped position and an oscillating end coupled to the armature part at a point of application and acting on the armature part in a direction of motion;

wherein when the armature part is in the center position, the point of application of the spring on the armature part is axially displaced a predetermined distance from the clamped position of the spring, such that the spring is pre-tensioned to apply a force in the axial direction.

14. (Rejected) The drive unit according to claim 13, wherein the spring is configured as to be spring tensioned transverse to the direction of movement of the armature part.

15. (Rejected) The drive unit according to claim 14, wherein the spring comprises a leaf spring, a coil spring or a helical spring.

16. (Rejected) The drive unit according to claim 13, further comprising a plurality of springs disposed on each side of the center position.

17. (Rejected) A compressor comprising a pump, a plunger and the drive unit of claim 13, wherein the axial displacement of the point of application of the spring on the armature part is provided in the direction away from the compressor.

18. (Rejected) The drive unit according to claim 13, wherein the spring has a spring constant selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force.

19. (Rejected) The drive unit according to claim 13, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position.

20. (Rejected) A linear drive unit comprising:

a yoke body having an exciter winding providing a magnetic field;

a magnetic armature part which is set in linear oscillating motion about a center position in an axial direction by the magnetic field of the winding, the center position being the position where the center of the armature is aligned with the center of the yoke body and/or windings thereof, the center position being an equidistant point between two maximum lateral deflections of the magnetic armature when oscillating; and

a spring having a fixed end clamped in a fixed manner at a clamped position with respect to the yoke body and an oscillating end coupled to the armature part at a point of application and acting on the armature part in the direction of motion;

wherein when the armature part is at the center position, the point of application of the spring on the armature part is displaced axially by a predetermined distance in relation to the clamped position of the spring, and

wherein the spring is configured to be pre-tensioned to apply a force in an axial direction along movement of the armature part when the armature part is at the center position.

21. (Rejected) The drive unit according to claim 20, wherein the spring comprises a leaf spring, a coil spring or a helical spring.

22. (Rejected) The drive unit according to claim 20, further comprising a plurality of springs disposed on each side of the center position.

23. (Rejected) A compressor comprising a pump, a plunger and the drive unit of claim 20, wherein the axial displacement of the point of application of the spring on the armature part is provided in the direction away from the compressor.

24. (Rejected) The drive unit according to claim 20, wherein the spring has a spring constant selected such that the characteristic frequency of the drive unit in cooperation with the total oscillating mass is lower than the frequency of the driving force.

25. (Rejected) The drive unit according to claim 20, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position.

26. (Rejected) The drive unit according to claim 7, wherein the armature part includes two magnets arranged symmetrically on each side of the yoke body in the center position.